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(71) Applicant(s)  
**NT Shapland & Petter Limited**

**(Incorporated in the United Kingdom)**

**Raleigh Works, BARNSTAPLE, Devon, EX31 2AA,  
United Kingdom**

(72) Inventor(s)  
**Arthur Kenneth James Phillips**

(74) Agent and/or Address for Service  
**Williams, Powell & Associates  
34 Tavistock Street, LONDON, WC2E 7PB,  
United Kingdom**

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(56) Documents Cited  
**GB 2082235 A GB 2045077 A GB 1491632 A  
GB 1361385 A GB 1332551 A GB 1185145 A  
GB 1115181 A GB 1046287 A**

(58) Field of Search  
**UK CL (Edition L ) B5A AB19 , E1J JGA JGG JGK JGL  
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(54) **Doors, windows and frames**

(57) Door, window and frame units are edged with polyurethane. The unit has elliptical edges and radiused corners for ease of cleaning.

The polyurethane can be moulded onto porous substrates such as chipboard; with non-porous substrates a bonding agent can be used or the substrate can be totally encapsulated.

The edges can have recesses to hold catches, locks and hinges.

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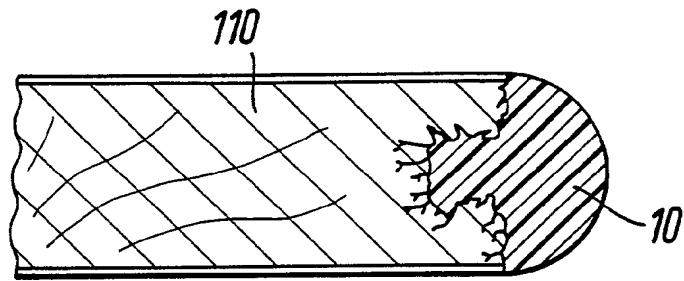


Fig. 1

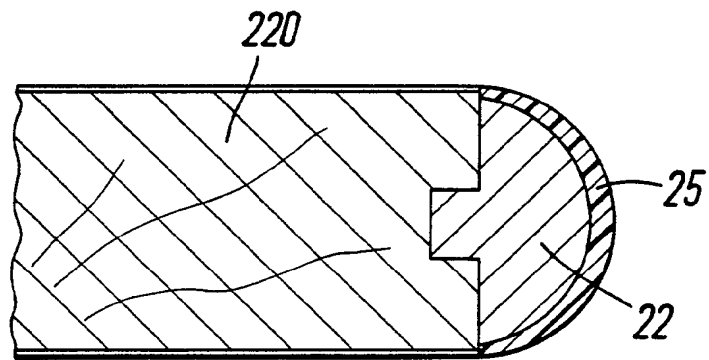
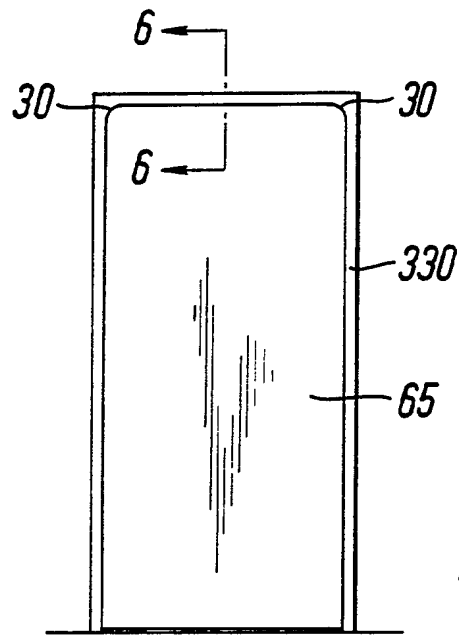
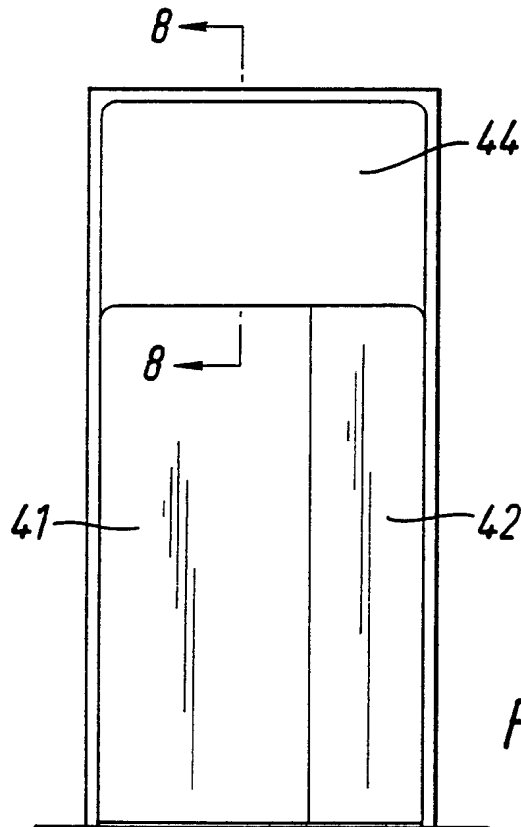


Fig. 2

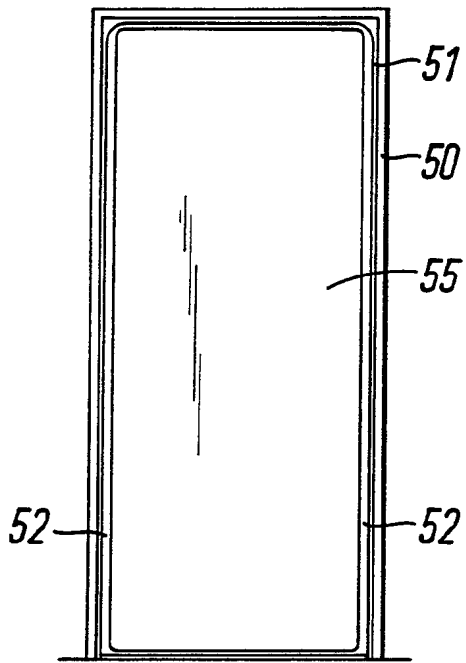
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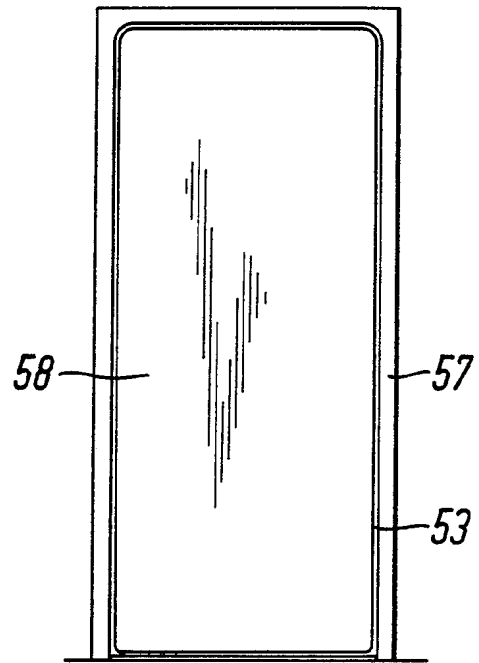
*Fig. 3*



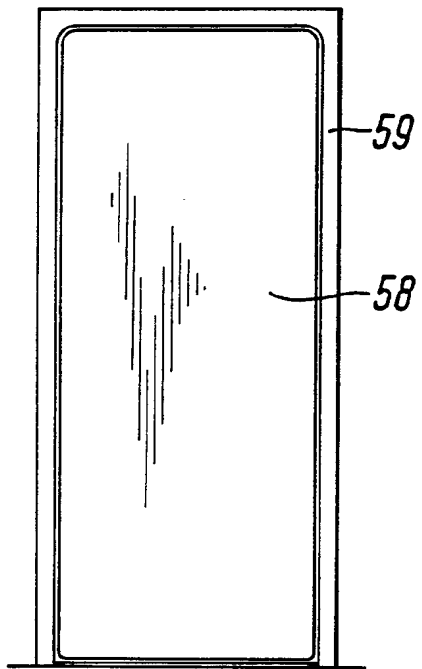
*Fig. 4*



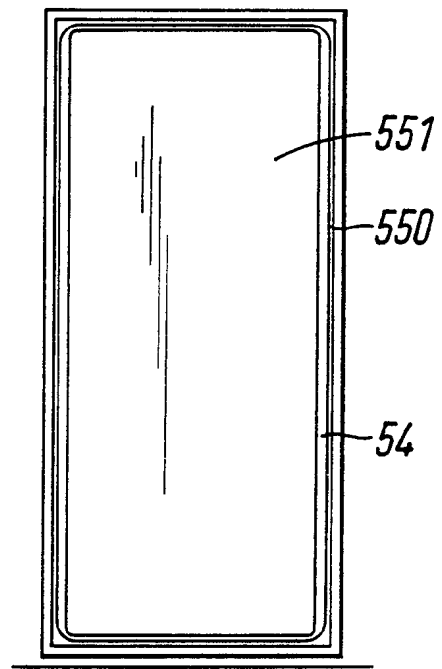
*Fig. 5a*



*Fig. 5b*



*Fig. 5c*



*Fig. 5d*

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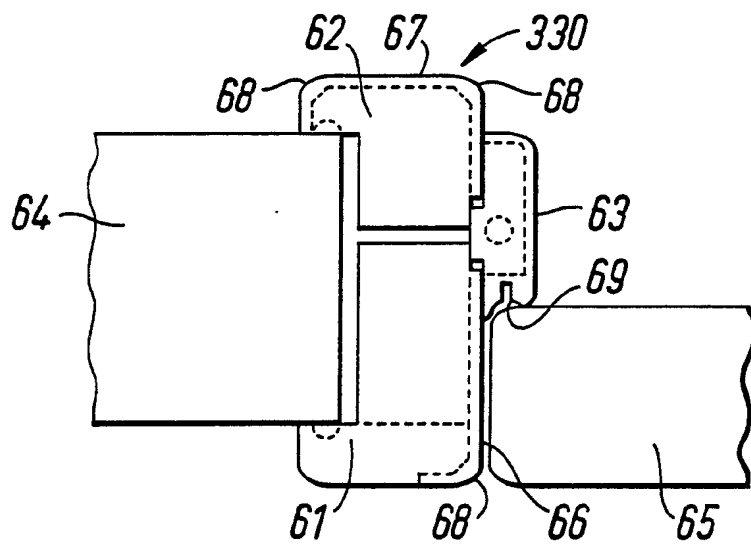


Fig. 6

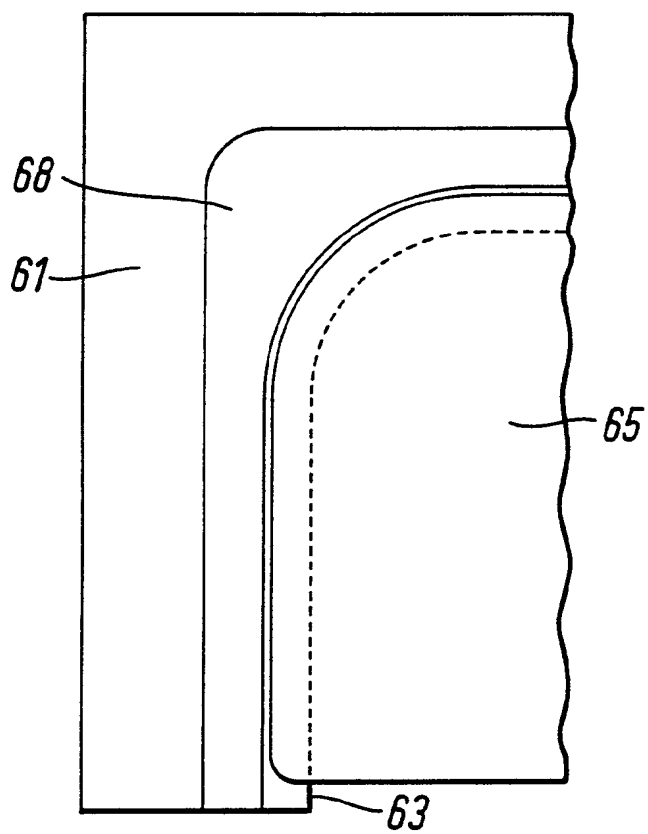


Fig. 7

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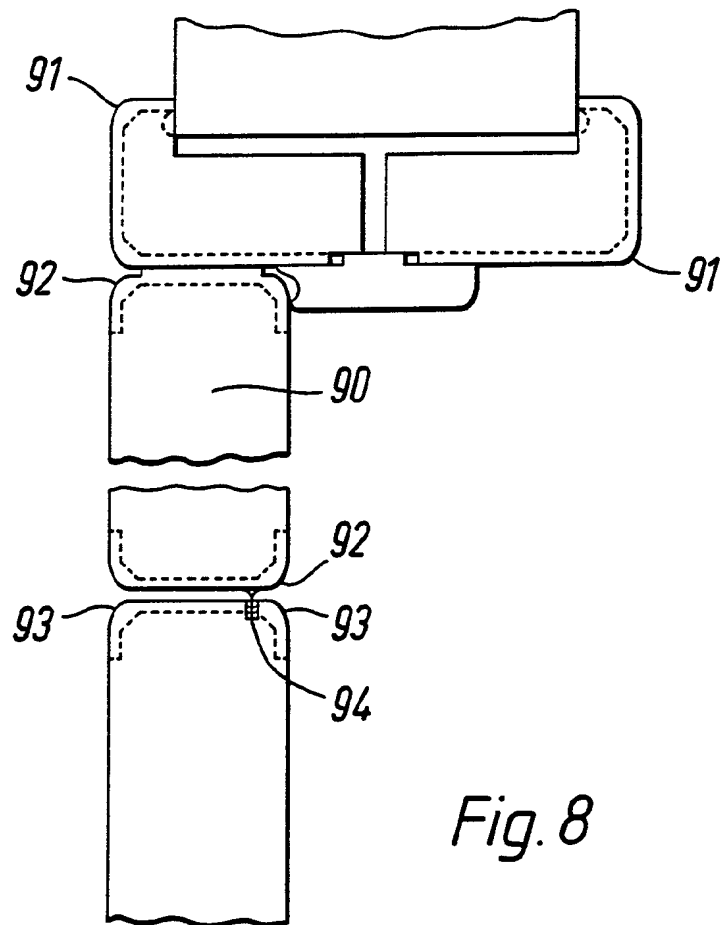


Fig. 8

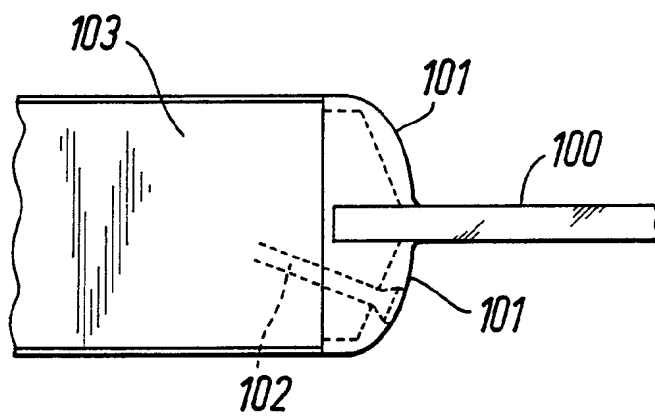
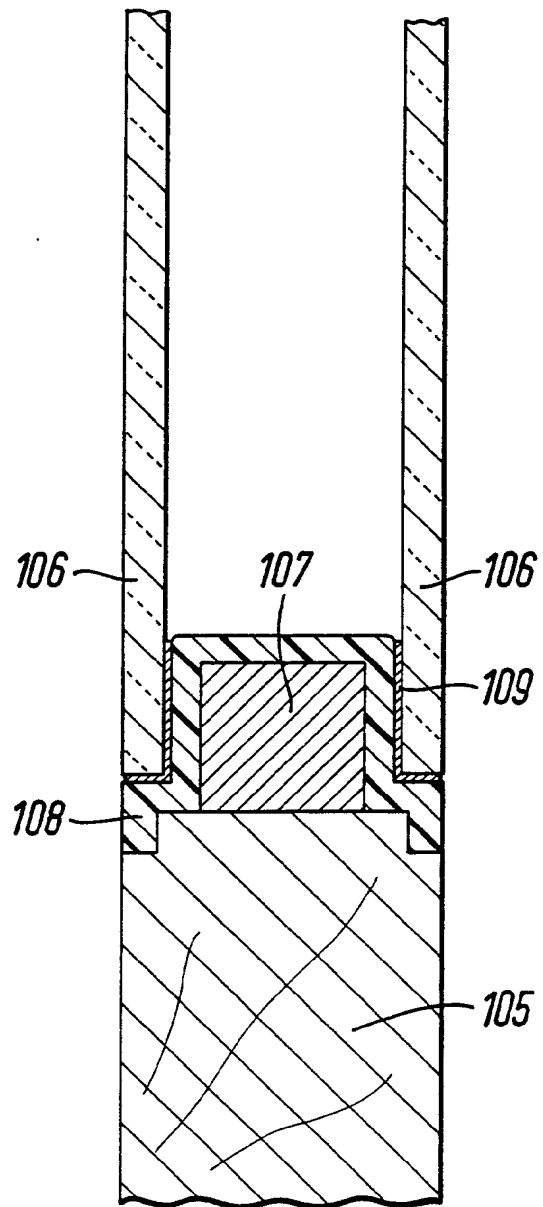


Fig. 9

*Fig.10*

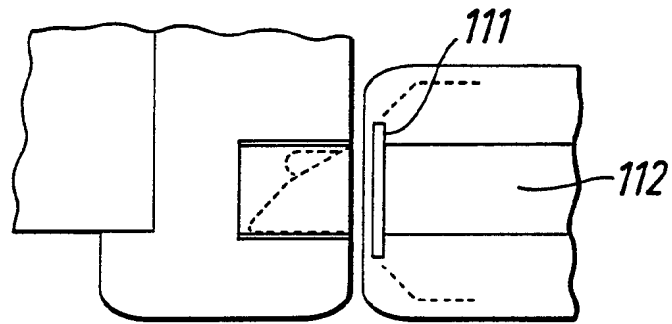


Fig. 11a

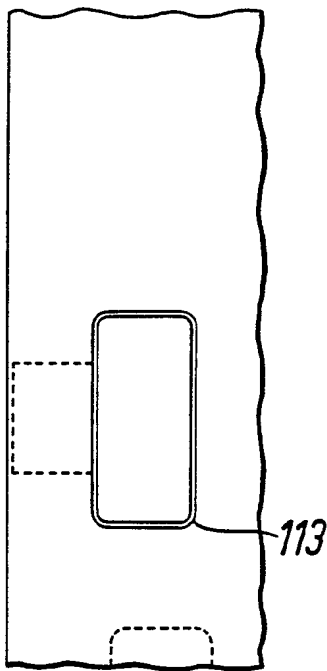


Fig. 11b

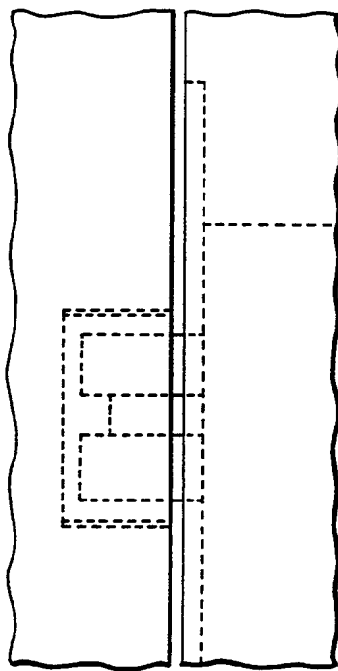


Fig. 11c

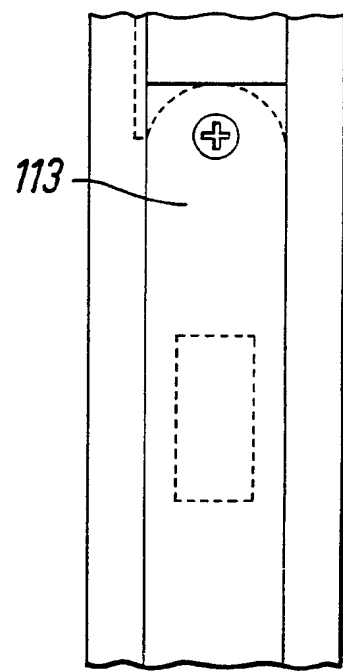


Fig. 11d



Door and Frame Unit

5 The present invention relates to means for closing an aperture in a wall, and in particular to a door and frame.

10 Known door and frame units are made from wood. The frame is usually made from timber lengths and the door is often made from cores of chipboard or other forms of timber with facings of chipboard, plywood or  
15 hardboard. The limitations of the materials of construction give rise to sharp edges and corners which are difficult to keep clean, are vulnerable to damage, and are hazardous to the user. Conventional construction requires additional operations to prepare the door and frame for locks and hinges.

20 The present invention seeks to provide a door and/or frame with rounded edges and/or radiused corners. Such a unit is suitable for use in hospitals and other buildings which require a high level of cleanliness and where doors are often subject to severe misuse and consequent damage.

25 It is known to produce furniture components such as desk tops from cellulosic panels that are either encapsulated with or edged by moulded polyurethane (PUR).

30 It is also known to produce doors with PVC and plastic laminate edges. However, the bond with the substrate is not perfect and so there is a tendency for the edging to come away in use. Also such edgings are not sufficiently durable to resist damage.

35 Accordingly, a first aspect of the invention comprises a door and/or a door frame for an aperture in a wall,

at least an edge of which is covered in a plastics material to effect a jointless bond with the frame and/or door.

- 5 In a preferred arrangement, the plastics material is infused into the door and/or frame.

Preferably, the plastics material is polyurethane.

- 10 Preferably, the door and/or frame have edges that are curved in cross-section. The edges may be part-elliptical in cross-section. The plastics material may have a dual hardness.

- 15 Preferably, one or more of the corners of the frame and/or door is radiused.

- The plastics material may just be on the edges of the door or frame or it may encapsulate it. Only one side  
20 of the door may be covered.

Preferably, the door and/or frame is made from one or more celulosic materials.

- 25 A second aspect of the invention provides a door and/or door frame for an aperture in a wall, at least the edge of which is covered in polyurethane.

- The invention also provides a door and frame unit, the  
30 door and/or the frame being as described above, wherein the upper part of the frame is filled by a panel above the door.

- The invention also provides a mould for making doors  
35 and/or frames as described, wherein the length and/or width of the mould is adjustable to adjust the height

and/or width of the frame and/or door.

5 A third aspect of the invention provides a door or frame edged with polyurethane, wherein the edge contains one or more recesses formed to hold catch, lock or hinge components.

10 A fourth aspect of the invention comprises a window frame at least an edge of which is covered with polyurethane.

15 In order that the invention and its various other features may be understood more easily, embodiments thereof will now be described by way of example only, with reference to the drawings, wherein:-

Fig.1 is a cross section through a typical door panel edged with polyurethane (PUR);

20 Fig.2 is a cross section through a typical panel edged with an alternative arrangement of PUR mouldings;

Fig.3 shows a front view of a single door and frame unit with PUR edging;

25 Fig.4 shows a front view of a double door unit with an over-panel and PUR edging;

30 Figs.5a to 5d show four variants of the unit shown in Fig.3;

Fig.6 is a section on 6-6 in Fig.3;

Fig.7 is a detail of the corner of the unit in Fig.3;

35 Fig.8 is a section on 8-8 in Fig.4;

Fig.9 shows a glazed section of a door as shown in any earlier drawings;

Fig.10 shows a further glazing arrangement; and

5

Figs. 11a to 11d show catches fitted to any of the doors shown in the earlier drawings.

Fig.1 shows a door panel trimmed with PUR 10. The PUR infuses into or permeates the timber construction forming a very strong bond. The construction is jointless. The door panel can be edged with PUR as shown, or completely encapsulated in a PUR skin.

Fig.2 shows an alternative arrangement for moulding the PUR edging 25 where the door panel is first edged with a timber lipping 22.

Fig.3 shows a door/frame unit according to the invention. The corners 30 of the door and frame are radiused. PUR can be applied to either the edges of the door and/or frame. Different configurations are discussed in relation to Fig.5.

Fig.4 shows an alternative unit having two door panels 41,42 and an over-panel 44.

Different door/frame unit configurations are shown in Fig.5. Fig.5a shows a combined timber 50 and PUR 51 frame and a door having a wide PUR edge 52 on the vertical edges.

Fig.5b shows a door frame that is completely faced in PUR and a door with a narrow PUR edge 53 on all edges.

35

Fig.5c shows an all timber frame with the door shown in

Fig.5b.

Fig.5d is a bulkhead type door unit which has a frame on four sides. The frame is PUR and timber, and the door has a PUR edge 54 on all edges.

Fig.6 illustrates the construction of the unit shown in Fig.3. The frame is in two parts 61,62 each being separately fixed with fixings concealed by a stop member 63. The frame is fixed to a wall 64 and supports a door 65. The edges of the door are either edged with PUR 66 (part 61), in order to retain some decorative wood appearance or to limit the protection provided by the PUR to vulnerable areas, or completely faced in PUR 65 (part 62). Both alternatives are shown in Fig.6. The PUR coated edges 68 of the frame are part-elliptical in cross-section. The part-elliptical edges provide a smooth edge for ease of cleaning and resistance to damage but provide a sufficiently wide flat edge for seals or locks to be fitted. The stop 63 is formed from a base material such as MDF, chipboard or hardwood coated in PUR on the visible surfaces. A recess 69 can carry a seal (not shown).

Fig.7 shows a detail of the corner of the unit shown in Figs. 3 and 6. The frame is timber 61 with a PUR edging 68. The stop 63 extends around the corner. The corners of the door and frame are radiused.

Fig.8 is a section through the unit in Fig.4. This is similar to the unit shown in Fig.6 but has an over-panel 90 between the door and the frame. A stop extends down both sides of the door. The corners of the frame 91, the over-panel 92, and the door 93 are all part-elliptical in cross-section. A seal 94 extends along the top of the door.

Fig.9 shows how a glazed panel can be inserted into the doors shown. A glass sheet 100 is held between two beads 101. The beads are made from a base material coated with PUR on its outer surfaces. Fixings 102 (only one shown) can be used to secure the beads to the door 103.

Fig.10 shows a further arrangement of a glazed panel in a door 105. Two sheets of glass 106 are separated by a spacer 107 coated with a PUR layer 108. The glass is bonded to the PUR by a layer 109 of adhesive as mastic.

This arrangement has the advantage that the glass is flush with the outside of the door. This makes the door easy to clean. The arrangement also minimises the number of ledges on which dust can settle.

The glass may be bonded directly to the door using the PUR layer as the adhesive. To improve the bond between the glass and PUR the edge of the glass can be chamfered.

The spacer can be omitted and the glass held in recessed in the outside of the door panel. A layer of soft PUR can take up any tolerances in the unit. A single sheet of glass can be used if double glazing is not required.

Fig.11 shows how a lock is fitted to the door and frame units described. The door is moulded with a small recess 111 either side of the door centre line (Fig.11a). The recess is formed in the PUR during moulding. The lock case 112 and forend 113 extend through this recess. Fig.11b shows the keep 114 in the frame and Fig.11c shows the front elevation of the unit when it is closed.

The hinges holding the door panels to the frame are positioned in moulded recesses in the PUR and screwed directly onto the chipboard panel of the door. A further PUR layer can be moulded over the part of the hinge that is screwed to the door panel.

To produce a PUR edging on a frame section or door panel the prepared panel or section is inserted into a mould made from silicon rubber, glass reinforced plastic or epoxy resin, on a timber frame. The mould is formed in two parts which are clamped together around the panel or section. The PUR material is supplied in two parts which are mixed in a nozzle prior to injection in the mould. The mould is then inclined so that the edge to be coated is at an angle. The PUR edging material is forced under low pressure into the lower corner of the mould. The mould is vented at the top corner.

To produce a unit having an over-panel such as is shown in Fig.4 adjustable moulds can be used so that the over-panel height and the length of the frame sections can be varied.

The PUR penetrates cellulosic substrates, forming a very strong bond. For example, the PUR can penetrate up to 10mm into a chipboard panel. Panels and lintel sections of almost any thickness can be edged. A single edged section can be up to 7m in length. The process produces joint free edges which are impenetrable to moisture.

If a thick panel is used the PUR edging tends to shrink back. If high tolerances are required the thickness of the PUR coating should be kept constant. This can be done by using the arrangement shown in Fig.2.

The properties of the PUR used can be varied by the use

of additives. The hardness of the PUR can be varied from Shore D70 to Shore A30. Generally isocyanate polyurethanes are preferred to polyol polyurethanes because of their stability to ultra violet light.

5 Anti-bacterial agents can be added to the PUR. Other additives can be used to improve the performance in a fire.

10 The PUR moulding can be applied in any colour that is desired.

Door/frame units incorporating PUR edges have a number of advantages over known units. The units have curved, edges. This makes them safer to use and less vulnerable

15 to damage when hit by, say, trolleys. This is particularly so if a soft PUR is used that will absorb impact.

The corners of the doors, frames, and glazed apertures

20 are radiused. This means that they are easier to clean and trap less dirt than conventional right-angled corners. This also allows a continuous seal to be formed around the door/frame gap. This is important for clean applications such as hospital operating theatres, and

25 stops the spread of smoke in a fire.

The nature of the PUR material gives it a number of advantages for use in the type of unit described. The unit is durable because of the strength of bond between

30 the substrate and the PUR moulding. The PUR moulding itself is durable and abrasion resistant. The moulding can be made in virtually any colour. The material has satisfactory combustion characteristics for use in hospitals and other high safety areas. The material is

35 also capable of being recycled. PUR will resist most domestic cleaning agents and organic solvents.



A number of modifications can be made to the embodiments described. The basic design of the door/frame unit can be varied and PUR can be applied to selected edges of the frame or door. The doors and frames shown in Figs 5a to 5c can be used in any of the various combinations shown.

The moulding process may also be used on non-porous substrates such as steel, glass and aluminium. A suitable bonding agent must be used or the substrate must be totally encapsulated.

The surface texture of the PUR moulding can be varied. The PUR edges can be moulded in a dual hardness material.

The seal 94 on the unit shown in Fig.8 is an optional feature. Various seals can be used with the doors shown to fulfill different requirements.

The PUR can be in a chosen hardness (of softness) to suit different performance requirement.

The part-elliptical edges can have any suitable rounded cross section. Alternatively the corners may be square.

The PUR edging can be applied to window frames instead of doors and frames.

A disc can be fitted to the overpanel 44 of the unit shown in Fig.4. The disc is positioned where the doors 41,42 meet and acts as a stop.

Claims

1. A door and/or door frame for an aperture in a wall,  
at least an edge of which is covered in a plastics  
5 material to effect a jointless bond with the door and/or  
frame.
2. A door and/or frame according to claim 1, wherein  
the plastics material is polyurethane.  
10
3. A door and/or frame according to claims 1 or 2 made  
from a porous material, wherein the plastics material is  
infused into the door and/or frame.
- 15 4. A door and/or frame according to any preceding  
claim, having edges which are curved in cross-section.
5. A door and/or frame according to claim 4, wherein  
the edges are semi-elliptical in cross-section.  
20
6. A door and/or frame according to any of claims 2 to  
5, wherein the polyurethane is in two sections, each  
having a different hardness.
- 25 7. A door and/or frame according to any preceding claim  
wherein one or more of the corners is radiused.
8. A door and/or frame according to any preceding  
claim, wherein the edges are covered in said plastics  
30 material.
9. A door and/or frame according to any of claims 1 to  
7, which is encapsulated in said plastics material.
- 35 10. A door and/or frame for closing an aperture in a  
wall, at least an edge of which is covered in

polyurethane.

11. A door and/or frame according to any preceding claim, wherein the door and/or frame is made from one or  
5 more cellulosic materials.

12. A door and frame unit, the door and/or frame being according to any preceding claim, wherein the upper part of the frame is filled by a panel above the door.  
10

13. A door and/or frame substantially as herein described with reference to the accompanying drawings.

14. A door and/or frame for an aperture in a wall made from a porous material, at least an edge of which is covered in a plastics material, wherein a portion of the plastics material is infused into the porous material.  
15

15. A mould for making a door or frame according to any preceding claim, wherein the length and/or width of mould is adjustable to adjust the height and/or width of the frame or door.  
20

16. A mould according to claim 15 for a door having one or more glazed panels, wherein the mould is further adjustable to vary the size of the glazed panel(s).  
25

17. A door or frame edged with polyurethane, wherein the edge contains one or more recesses formed to hold catch, lock or hinge components.  
30

18. A window frame at least an edge of which is covered in polyurethane.

19. A method of making a door and/or frame for an aperture in a wall, comprising the step of moulding a  
35

substrate with a plastics material.

20. A method of making a door and/or frame for an aperture in a wall, substantially as herein described.

**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

Application number  
 GB 9309236.9

**Relevant Technical fields**

(i) UK Cl (Edition L ) E1J (JGA JGG JGK JGL JGS JGX  
 JM JHX JXX) B5A (AB19)  
 (ii) Int Cl (Edition 5 ) F06B 1/34 3/30 3/88

**Search Examiner**

J E FULCHER

**Databases (see over)**

(i) UK Patent Office

(ii)

**Date of Search**

5 AUGUST 1993

Documents considered relevant following a search in respect of claims

1-9, 13, 14, 20

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2082235 A (SLOMAN)	1
X	GB 2045077 A (BLANC)	1
X	GB 1491632 (BAUKNECHT)	1
X	GB 1361385 (COMPTON)	1
X	GB 1332551 (S VEDEX)	1
X	GB 1185145 (STOREY)	1
X	GB 1115181 (ICI)	1
X	GB 1046287 (FORMWOOD)	1

Category	Identity of document and relevant passages — 14 —	Relevant to claim(s)

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